

# Liquidity – Profitability Relationship Analysed Once Again. The Case Of Poland

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## Abstract

In this article, a study on relationship between liquidity and profitability of an enterprise are presented. Besides traditional measures of liquidity and profitability, the analysis takes account also of dynamic measures, i.e. the cash conversion cycle and the economic value added. The authors demonstrated that the lack of cohesion in the theory in the case of statistical measures may result from the certain snapshot effect, whereas the analysis of dynamic measures allows the interpretation of ratios consistent with the theory. This article also presents EVA (Economic Value Added) as a financial ratio for the calculation of which not all accounting corrections proposed so far must be used.

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**Keywords:** Liquidity, profitability, EVA

## Introduction

The analysis of the relationship between liquidity and profitability, presented extensively in the literature, has not yet brought an unequivocal answer to the question what this relationship is, despite the fact that there is a fundamental theory saying that together with the growth of liquidity, profitability decreases. Traditional liquidity ratios are of static nature, that is why their interpretation does not allow an in-depth analysis of the essence of the problem which occurs when the results of studies conducted are in contrast with the theory. Changes in business models of enterprises which are happening today also reveal faults in traditional profitability ratios. For example, in the case of leased buildings or machinery ROA (Return on Assets) becomes not fully reliable due to the significant impairment of assets. The weakness of ROE (Return on Equity), however, is that the enterprise must repay principal instalments of liabilities contracted from the profit which is in the numerator of that ratio, as a result of which the return on equity is not connected just with equity.

The relationship between liquidity and profitability is complicated also because liquidity does not have a uniform nature. Liquidity may be represented by many ratios, called dynamic or static. Thus, liquidity may be described as solvency and then ratios based on the relationship of current assets and liabilities should be taken into account. The second approach to liquidity is related to the structure of assets because the more there is of liquid assets, i.e. cash and its substitutes, the lower the risk of insolvency, and it is then said that the enterprise is more liquid. On the other hand, liquidity may be defined as the speed of the flow of cash, as it has been described by Richards and Laughlin (1980) who proposed the cash conversion cycle as the dynamic liquidity measure. Free cash flow from operating activity has been suggested by Bernstein (1985) as the best measure of liquidity in the context of cash generation.

The transformation of economies into market-oriented ones should be noted, which has direct impact on the management of enterprises. Exchanges develop and consolidate, performing the function of centers to increase capital, including that of pension funds. That is why the rates of return to be taken into account are those required by investors – who can achieve a more or less aggressive liquidity management policy – which is connected with the rate of return, because the higher the risk, the higher the expectations as to the rate of return, and thus the growing cost of equity which is not included in traditional profitability ratios. The analysis of results of an enterprise in separation from the capital market and without taking account of the cost of equity, which takes place in the case of traditional profitability measures, may constitute an error leading to incorrect conclusions.

The ratio resolving the problems with interpretation of the relationship between liquidity and profitability may be the economic value added (EVA). The concept of value added is what investors expect, knowing that they receive more than they should get in relation to their requirements. The traditional profitability measures do not offer such a possibility, the results must be compared against the competitors or the industry average in order to find out whether the given company operates well or not. In the case of EVA, its positive value shows good effectiveness of an enterprise. However, this ratio has been seized by accountants who started to find dozens of corrections which should be made to calculate it. We want to demythologize this ratio as a difficult and complicated in its structure. It can be assumed with probability bordering on certainty that EVA may be calculated simply, without corrections, and it will be just as good to measure profitability as other ratios. Besides, striving to simplify things is in human nature, that is why taking generally available data into account may have a positive impact on the use of this measure by managers and investors.

The objective of the article is to show, that simply calculated EVA is as good as other ratio of profitability and it could be helpful to capture the relationship between profitability and liquidity. The presented approach is our original contribution to the study of the relationship of profit and liquidity.

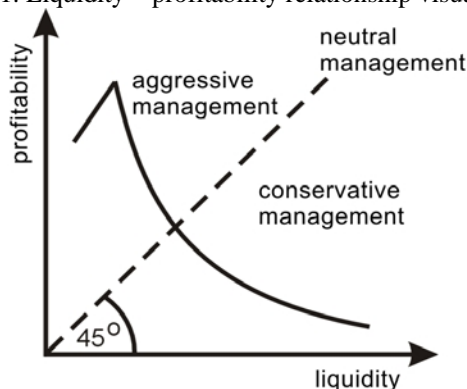
In this article, we put forward the following hypotheses: firstly - EVA calculated without corrections is just as good a measure of profitability as ROE and ROA, which translates into strong positive correlation between those ratios. Second hypothesis: EVA, due to its nature allowing for the cost of capital, allows the relationship between profitability and liquidity to be captured in a more reliable way. The article is composed of four parts. In the beginning, a discussion conducted in scientific journals in the context of the problems formulated has been presented. We have conducted a multi-layered study of the relationship between liquidity and profitability. The next part presents the methodology of the study and the methods of calculating ratios, and goes on to present the results of studies conducted. At the end, conclusions have been formulated in which the authors refer to the hypotheses put forward.

## I.

### Analysis of the problem and literature

The concept of the relationship between liquidity and profitability was at the root of the studies presented in this article. This relationship has been studied for a long time by scientists and has ceased to arouse emotions. In this article, we wish to return to the concept related to the study of liquidity and profitability, showing a different face of this problem. Different conclusions may be drawn from many studies conducted so far in almost all markets. The concept of the liquidity – profitability relationship is presented on the Figure 1.

Figure 1. Liquidity – profitability relationship visualization



Source: own work on the basis of Gajdka, J., Walinska, E., 1998, Zarzadzanie finansowe, teoria i praktyka, t.2, FRR, Warszawa, s. 467.

Profitability and liquidity are measured using any method, and the results confirm or deny the existing theory. Smyth et al. (1972) referred to the relationship between liquidity and profitability, taking account also of the size of the enterprise, its innovativeness, and analysing three sectors in the British market. This is quite an old study, indicating that this problem has been bothering scientists for a long time. We wish to quote several examples of studies conducted to determine the relationship between liquidity and profitability, indicating the lack of possibility for comparing results and stating explicitly that profitability decreases as liquidity increases. Eljelly (1991) examined the relationship between liquidity and profitability in Saudi Arabia, whereas liquidity was measured as the current ratio and the cash conversion cycle. He found that there was a negative correlation between liquidity measures and profitability. Jose et al. (1996) conducted studies in the American market and found that an aggressive liquidity management policy has a positive influence on profitability, and thus – the lower the liquidity, the higher the profitability. We extended our studies and in 1998 published results which indicated that the cash flow from operating activity as the profitability measure was positively correlated with the current ratio and the cash conversion cycle, and with retained earnings. In this study, cash flow was taken into account as the profitability and not liquidity measure. The studies conducted by Deloof (2003) in the Belgian market should be noted, in which the author took account of the receivables turnover ratio and the inventories turnover ratio and found that reducing these cycles has a positive impact on profitability, and less profitable companies wait longer for the payment of their invoices because CCC (Cash Conversion Cycle) is higher, and the company less liquid in this context. CR (Current Ratio), however, is also higher due to the higher level of receivables and in this case this means higher liquidity. In the face of the obvious contradiction between the interpretation of those measures, the general formulation of a theory – that as liquidity increases, profitability decreases – makes no sense and may refer only to static measures. Lazaridis et al. (2006) conducted an analysis of the relationship between liquidity and profitability in the Greek market and used the operating profit margin as the profitability measure and the cash conversion cycle as the liquidity measure, and they found that there was a statistically significant relationship between them, and managers should shape the components of the CCC at an optimum level. Studies concerning the relationship between liquidity and profitability have been conducted also for the Chinese market (Wang, 2012) or the Indian market (Gowthami, 2012). It should be noted that in each study authors choose any given liquidity or profitability ratios, depending on the private view of which measure best reflected the given phenomenon. This makes the comparison of results and formulation of one uniform conclusion for markets with regard to

liquidity and profitability impossible in the face of developing notions of liquidity and profitability. We decided to collect and examine liquidity ratios representing different approaches to the problem, in order to allow the formulation of uniform conclusions concerning liquidity.

Measuring the profitability of enterprises also remains disputable due to the large number of ratios at the researcher's disposal and their nature. We took into account the measure allowing for the cost of capital, which refers to the future operations of the enterprise, in order to avoid static assessment of profitability in relation to liquidity. Stewart (1991) proposed EVA as the measure showing the true value added generated by an enterprise after allowing for the cost of equity and cost of debt, and the tool for management of the value of the enterprise. The EVA ratio is also gaining popularity in China, where a number of publications have been prepared on this topic, and enterprises generally use this measure to manage value. A certain problem which should be noted is the method of measuring EVA. Corrections which should be taken into account for the calculation of this ratio make it one of the most complicated measures, which may affect its popularity. Marad and Balu (2009) proposed a type of parallel between net profit and EVA, and presented the methodology for calculating three main components of EVA, i.e. NOPAT (Net Operating Profit After Tax), WACC (Weighted Average Cost of Capital) and the value of invested capital. In turn, Brad and Munteanu (2012) found that it is necessary to increase the transparency of financial reports in order to allow the calculation of EVA. When analysing the above problem, we decided to use the simplest method of calculating EVA without making any corrections, taking account of direct data presented in financial documents. EVA is a financial and not accounting ratio. Manipulations in the accounting area increase the probability that corrections will further distort the result. A simple approach to the calculation of this ratio may have a positive impact on the universality of its use. The authors hope to break the image of EVA as a ratio which is difficult to calculate, proving that it is the same measure for measuring profitability as ROE or ROA, which was pointed out by Chen and Wang (2004). It was also confirmed by Hilmola (2001) whose research indicated the level of market development and capital structure, which additionally affect the value of a company. Kim (2006) stated that from the point of view of accounting EVA could not be calculated, which points to finances related to the capital market as the correct approach to corporate finance management. By comparing traditional profitability measures with those based on value, the study contributed to the increase in potential and comparability of traditional and value-based ratios. Chmielikowa (2008) compared traditional profitability ratios and EVA and found a strong positive correlation of EVA with ROE and ROA, and Altendorfer and Jodlbauer (2011) created a model based on

the maximisation of EVA in connection with the production system, which allowed the search for further relationships between EVA and effectiveness-based ratios, such as the cash conversion cycle. In consequence, some researchers have found that EVA should be generally universally used (Chen, Ma, 2010). In a study presented by Aggarwal and Sharma (2011), the authors state that EVA is a better measure for measuring profitability in developed countries than in developing ones, so from this point of view it may be expected that Poland is among the developed countries if the hypothesis about the positive correlation between EVA and ROE and ROA is confirmed. The uniqueness of EVA consists in the fact that it takes account not only of the current results, such as ROE or ROA, but also past and future ones, in connection with the cost of capital determined on the basis of historic data and prognoses for the future. This is why, following the example of Li (2013), Li (2010) and Kopacz et al. (2007), a note should be made of the importance of EVA in strategic management and assessment of the activity of an enterprise from a wider perspective.

### **Methodology and data**

We have made an assumption that EVA is just as good, if not better, a ratio to study profitability as ROE and ROA, although its nature may place it higher in hierarchy. The duality of the nature of EVA has been noticed, resulting from the inclusion of current results in the net operating profit, and future, anticipated results reflected in the level of weighted average cost of capital. We will examine the relationship between EVA and traditional profitability measures, in order to find out whether these measures may be applied interchangeably to the measurement of profitability. In studies connected with the cost of capital, the sorting of data allowing the conducting of the cross-sectional regression analysis was proposed. This approach is known in the world of finance. It was applied for example by Black, Jensen and Scholes (1972) in the research on the Capital Asset Pricing Model. Through the sorting of data, atypical cases were eliminated – ones which in a classical regression analysis would have been eliminated using binary variables. We expect therefore that where the data have been sorted by profitability, strong correlations will occur between profitability and liquidity measured using dynamic ratios.

Data from the Notoria database for non-financial companies listed at the Warsaw Stock Exchange were used. Balance sheets of 395 enterprises were collected, and on their basis the ratios used in the study were determined, and the financial data were taken from the years 1997-2012. Some companies did not have all balance sheets, for example due to the period of their operation. Each company was qualified for the study, provided at least one year of its operations was included in the financial

reporting. The beta coefficient and then EVA were calculated for each company, and the calculated liquidity and traditional profitability ratios – ROE and ROA – were selected from the database. Cost of equity was calculated using CAPM and earlier calculated beta coefficient. We used in the study data of those companies for which all of the ratios calculated were available. This way, 2375 observations were collected.

It should be added that modified ratios – obtained by dividing the selected values by total assets – were used in the study. Such modified ratios include EVA, cash and NOPAT. These values after the transformation were referred to as: EVA ratio, Cash ratio and NOPAT ratio. However, in the case of CCC, the value obtained was divided by 360, as a result of which the percentage value of the cash conversion cycle in the year was obtained. This ratio was referred to as CCC ratio. Referring the ratios to the value of assets brought their level to the common dimension, making them independent of the size of the company.

At the subsequent stage of the study, all available observations were sorted according to the growing EVA ratio, ROE, ROA as well as NOPAT ratio and WACC. Each year, for each company, was treated as a separate observation. Thus sorted data were divided into ten portfolios. The first two portfolios, the fifth one and two last ones contained 238 observations each. The remaining ones – 237 observations each. And thus, consistently, after sorting them according to the EVA ratio the first portfolio contained all observations with the lowest ratio, and the last portfolio – those with the largest ratio. After sorting the observations according to ROE and subsequent variables, the situation was similar, however the first portfolio contained all observations with the lowest ROE, and the last portfolio – all observations with the highest ROE, and then the first portfolio contained the lowest ROA, NOPAT ratio and WACC, and the last portfolio – the highest ROA, NOPAT ratio and WACC. Medians for each ratio studied were calculated for each portfolio. Thus, data series with ten observations each were obtained. As has been mentioned before, such methodology allowed the elimination of atypical observations. An analysis was conducted on the ten average observations created with cros-sectional analysis.

Linear, quadratic and cubic correlations were examined. The relationship between NOPAT ratio and WACC was studied by sorting data according to the growing WACC. The results of studies were presented in tables. The EVA ratio was calculated on the basis of data from balance sheets of companies, and the cost of equity was calculated using the Capital Asset Pricing Model (Sharpe, 1964, Litner, 1965, Mossin, 1966). The annual beta coefficients were calculated using the daily data on listings of companies. The listings included both splits and possible pre-emption rights

or dividends. The method of least squares and the linear regression were used to calculate the beta coefficient.

$$\beta = \frac{cov(I,R)}{varR} \quad (1)$$

where:

cov(I,R) – covariance of rates of return from the shares of company I with rates of return from the wide market index (WIG),

varR – variance of rates of return from the wide market index (WIG).

Additionally, expected values of the additional rate of return were subject to modification. If the actual value of the risk premium was negative, it was assumed that investors would not accept such level, expecting the market to bring them income. Then, the risk premium was assumed at 5.5%. The theoretical risk premium was obtained on the basis of Damodaran database and the practice of Polish managers<sup>1</sup>. The risk-free rate was estimated on the basis of the average annual return on wholesale bonds with the longest term to maturity available at the given time. In the years 1997 and 1998, these were five-year government bonds, and in the years 1999-2012, ten-year bonds were used. The data concerning the return on government securities were obtained from the Ministry of Finance. The cost of capital was calculated on the basis of actual costs incurred by the enterprise to obtain debt funds. However, due to the modification of the calculation of EVA, no additional calculations were performed, and simply the financial costs entered in the balance sheet were used in the formula, as it is presented below.

$EVA = (\text{Operating profit} - \text{tax}) - (\text{equity} * \text{cost of equity} + \text{financial costs} * \text{tax shield})$

As has been said earlier, the following ratios were selected for the analysis besides EVA: current ratios (CR), quick ratios (QR), cash flow (CF), cash conversion cycle as percentage of days in a year (CCC ratio) and level of cash in relation to total assets (Cash ratio) and profitability measures ROA and ROE. The data were taken from or calculated on the basis of balance sheets of companies from the Notoria database. The results obtained as a result of the studies were presented in subsequent tables at the end of the text.

## Results of studies and conclusions

The studies conducted confirmed that EVA is a profitability measure just as good as ROE and ROA. The results of studies of the correlation between those ratios have been presented in table 1. The correlation is positive, high, and statistically significant. Thus, it may be concluded that EVA calculated in a simplified way measures profitability just as efficiently

<sup>1</sup> <http://pages.stern.nyu.edu/~adamodar/>



as ROE and ROA, its strength, however, is in the wider perspective of interpretations of the study results.

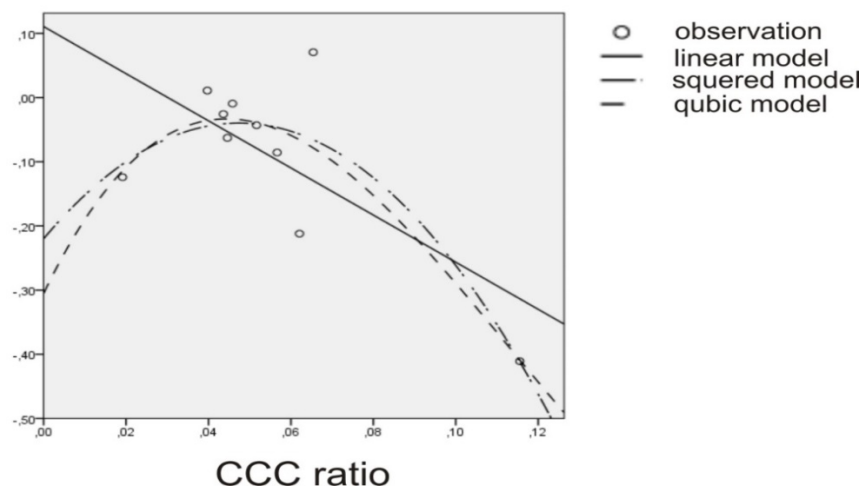
Tables 3 and 4 present results of the studies of relationships between traditional profitability measures, ROE and ROA, and selected liquidity ratios. These relationships are positive, which is inconsistent with the assumptions of the theory which says that as liquidity increases, profitability decreases because more funds are invested in working capital.

The study method presented confirmed the strong relationships between profitability and liquidity in the enterprise, which are incompatible with expectations. However, due to the nature of the data used, a kind of snapshot of the financial situation in the enterprise was obtained. This means that, as simple logic dictates, it was observed that together with the increase in profitability in the enterprise, the value of the liquidity ratios grew. The logic of this reasoning is based on an assumption that an entity which is profitable receives cash as remuneration. Thus, at the given moment, an increase in profitability is connected with an increase in liquidity. This may also be compared to a situation in which an employee receives the salary. On the day of payment the employee's liquidity is high, similarly as the profitability of work for which that employee received the remuneration. This, however, does not mean that this situation is permanent. It is not known what happens to this cash on the second day after the balance sheet has been drawn up. The same may refer to cash or inventories affecting the level of CR, they may be purchased on the following day, and their number may successively decrease in the subsequent weeks. However, the methodology of studying the correlation between liquidity and profitability on the basis of cross-sectional data will in no way provide an answer to the question about further directions of utilisation of cash. These funds may be committed to subsequent investment projects on the following day. Investments decrease profitability, the disbursed funds decrease liquidity, and the balance sheet at the end of the year will again show a "snapshot", however this time low profits will go hand in hand with low values of liquidity ratios based on the balance sheet. In the opinion of the authors, in order to avoid this "photographic trap", the process – and not the resource – should be examined. Thus, changes in profitability and liquidity should be monitored in the enterprise as frequently as possible, and additionally observations of profitability should be delayed by one period in relation to the liquidity observations. Then we can observe the inflow of cash, responses of the management board and the effect in the form of the value of subsequent profitability ratios reflecting the consequences of decisions made. The problem, however, lies in the fact that such observation, in a way "in vivo", may be impossible to execute. The observation of one specific entity in a longer term may constitute a certain solution. Comparison of many

entities and many observations could provide an answer to the question whether profitability actually grows as liquidity falls. This statement is good for static ratios, but is impossible to prove due to the snapshot effect, which the authors have indicated in relation to this approach to liquidity.

The results obtained also provoke the formulation of different conclusions. A strong correlation between profitability and liquidity has been observed. Only EVA does not provide uniform answers – but solely when the study is based on static liquidity ratios. That is why the components of EVA have been analysed thoroughly. The analysis has showed that both NOPAT and WACC are strongly correlated with liquidity ratios. However, as proved in further studies, NOPAT and WACC are poorly correlated with each other, and this correlation is negative, thus the lower NOPAT, the higher cost of capital. This, according to our beliefs, proves that despite the fact that components of EVA are correlated with liquidity ratios, their response to this liquidity is of different nature, and upon collision the correlation may cancel itself out, causing the lack of relationship between liquidity and profitability measured by EVA. In this context, the study of EVA and CCC looks extremely interesting. The cash conversion cycle may be accepted not so much a liquidity ratio but a predictor of this liquidity. The longer the cycle the less there is hope for liquidity. The reduction of future liquidity means waiting longer for cash. Thus, a certain duet was created: EVA – enabling to predict future profitability due to its application to the calculation of the expected rate of return determined by WACC, and the cash conversion cycle – showing future expected level of liquidity. As a result, the nature of these ratios relationship is very similar to the theoretical dependence presented on Figure 1 and confirmed on Figure 2.

Figure 2. CCC and EVA relationship  
EVA ratio



Source: own study.

The analysis of the relationship between EVA and liquidity ratios (the detailed data have been presented in Table 2) showed that for ratios referred to as static, CR and QR, this relationship is negative, although statistically insignificant. This result is close to the theoretical assumptions connected with the relationship between liquidity and profitability. Attention should be paid to the correlation between EVA and CCC, both measures are dynamic in nature and their relationship is very strong and statistically significant. This relationship should be interpreted as follows: together with the increase in the number of days in the cash conversion cycle, the economic value added decreases.

Considering the dynamic nature of EVA, the authors conducted an analysis of relationship between liquidity ratios and individual components of EVA. The detailed results of the analysis have been presented in Tables 5 and 6. It should be noted that all correlations are positive, and the statistical significance appears in most of the cases, including for CR and CCC both for NOPAT and WACC. After the correlation of NOPAT and WACC had been analysed, it turned out that it was negative, as presented in Table 7, and this explains the positive correlations of the liquidity ratios and components of EVA and the negative correlations (besides cash) of EVA and liquidity ratios. However, only the correlation between EVA and CCC is explained fully logically. The dual nature of EVA allows the deeper analysis of the relationship between liquidity and profitability.

## Conclusion

Summing up this study, we have proved that EVA calculated in a simplified manner, without the introduction of complicated corrections, is just as good a measure of profitability as ROA and ROE. The results of this analysis may help introduce this measure for general use without any concern that the absence of many data of accounting nature may result in the poorer quality of results. Thus, we recommend the simplification in calculating the economic value added. In the case of static profitability ratios, which are the traditional ROE and ROA, it is possible that the results do not reflect reality as the data represent the “snapshot” anomaly, particularly in connection with static liquidity measures. EVA, however, works best in a study with CCC because both measures are of dynamic nature and refer somewhat to the future. We have thus shown that the correlation between EVA and CCC is negative and profitability decreases together with the increase in the days in the cash conversion cycle.

The economic value added is a measure helping you to avoid the photo-trap in which an analyst using static ratios to make decisions, such as ROE or ROA, is caught. The quadratic function and cubic function show the correlation close to that described by theory. EVA is an anticipatory ratio,

operating mainly by using WACC, which is an expected value, EVA shows the picture of the company at the moment in which the management board has already identified what resources of cash and other liquid assets it had and which liabilities corresponded to them. Thus, the dual nature of EVA makes the observations dynamic, showing a wider picture of the reality.

Despite the fact that the studies of traditional ratios ROE and ROA with EVA show a strong correlation, which would demand a presumption that the relationship between EVA and liquidity is similar to that in the case of ROE and ROA, it turns out that in this case it is not so and EVA is correlated positively only with cash, which the authors explain by its dual nature. The combination of the results of company operations with the rate of return required by investors allowed a more in-depth analysis of this problem. Additionally, the correlations of ROA and ROE with liquidity measures proved to be strong and positive, and thus an increase in all ratios leads to an increase in profitability, which contradicts the theory, however it is difficult to explain why this happens in any other way than by accepting the existence of the “snapshot” anomaly.

The analysis of CCC and ROE and ROA profitability measures constitutes an interesting case. After a more in-depth analysis of the ratios, the authors are of an opinion that the studying of relationships between those measures is inconsistent on the basis of the theory. The ROE and ROA ratios are static measures, whereas CCC constitutes a certain prediction of future liquidity. With such an approach, these three measures are mutually incompatible and the interpretation of results may prove to be a misuse. On the other hand, if we accept that ROE and ROA are showing the current situation, and CCC constitutes a predictor of future liquidity, then the interpretation may be interesting because – as the tests conducted show – together with the increase in liquidity, demonstrated in the drop of CCC, profitability decreases – both for equity and total assets. However, the deliberations on this subject may prove to be somewhat of a trap – due to the incompatibility of ratios cited earlier.

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